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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/802,428	03/17/2004	Bin Zhang	200314385-1	3515
22879 7590 10/27/2010 HEWLETT-PACKARD COMPANY Intellectual Property Administration 3404 E. Harmony Road Mail Stop 35 FORT COLLINS, CO 80528			EXAMINER WERNER, DAVID N	
			ART UNIT 2483	PAPER NUMBER
			NOTIFICATION DATE 10/27/2010	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

JERRY.SHORMA@HP.COM  
ipa.mail@hp.com  
laura.m.clark@hp.com

### Office Action Summary

**Application No.**

10/802,428

**Applicant(s)**

ZHANG ET AL.

**Examiner**

David N. Werner

**Art Unit**

2483

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 July 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 5, 7-15, 17 and 19-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 7-15, 17 and 19-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. The Art Unit location of your application in the USPTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Art Unit 2483.
2. This Office action for U.S. Patent Application No. 10/802,428 is responsive to communications filed 28 July 2010, in reply to the Non-Final Rejection of 28 April 2010. Claims 1–3, 5, 7–15, 17, and 19–25 are pending.
3. In the previous Office action, Claims 1–3, 5, and 7–12 were rejected under 35 U.S.C. § 101 as non-statutory. Claims 1–3, 5, 7, 10–15, 17, 19, and 22–25 were rejected under 35 U.S.C. § 103(a) as obvious over “Motion-based Segmentation Using a Thresholded Merging Strategy on Watershed Segments” (“de Smet”) in view of “K-Harmonic Means–A Data Clustering Algorithm” (“Zhang”). Claims 8, 9, 20, and 21 were rejected under 35 U.S.C. § 103(a) as obvious over de Smet in view of Zhang and in view of “A Video Segmentation Algorithm for Hierarchical Object Representations and its Implementation” (“Hermann”). Claim 27 was rejected under 35 U.S.C. § 103(a) as obvious over de Smet in view of Zhang and in view of U.S. Patent No. 6,084,912 A (“Reitmeier”).

### ***Response to Amendment***

4. Applicant’s amendment to Claim 1 has been fully considered. The rejection of Claim 1 under 35 U.S.C. § 101 is withdrawn.

***Response to Arguments***

5. Applicant's arguments filed with respect to the prior art rejections have been fully considered but they are not persuasive. Applicant argues that the cited de Smet and Zhang references do not disclose the claimed limitations of "estimating motion paths" and "calculating values representing errors". The examiner disagrees. The de Smet reference is directed to a "motion-based segmentation" (§ 1) in which an "initial motion field" is first generated (§ 2.1). In generating the initial motion field, a series of estimated motion vectors are generated. Id. at § 2.1. This "motion field" comprising motion vectors is a set of the claimed "motion paths", and the "initial" motion field is the one generated in the initialization step. In segmentation, segments of an image are merged "based on the similarity of [the] motion vectors". Id. at § 2.3. In this application of the K-means clustering method, a difference between motion vectors would be a measure of similarity, with a smaller difference meaning a greater degree of similarity. In particular, de Smet checks to see if the "distance" between neighboring motion vectors is "below a certain threshold". Id. To use the language of the claim itself, a difference or distance between motion vectors is the claimed "error".

Since the K-Harmonic Means algorithm is useful in any application of the K-means algorithm, including "data compression and vector quantization" (Zhang § 1), if the Zhang algorithm discloses comparing differences, distances, or errors between

two vectors or data sets that represent vectors in this application as a condition of merging segments, the Zhang algorithm discloses the claimed step of calculating errors. It is noted that the current amendment to the claims replaces the phrase "distances" with "values representing errors". This does not appear to be a substantial amendment changing the scope of the claim, but rather a clarifying amendment with respect to the particular application of "estimating motion trials in video image sequences". As such, the previous interpretation of d(i,l) in Zhang as the previous "distance" incorporates the claimed "error". In the particular application of Zhang to segmenting an image based on motion, as in de Smet, the "center points" are believed to be the endpoints of the motion vectors in the field described in de Smet. Therefore, the combination of the de Smet and Zhang references, as a base clustering function described as useful for segmenting images based on motion, and the improved clustering function specifically designed as an improvement of the base function, is still considered obvious. The claim rejections are maintained and this action is made final.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject

matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1–3, 5, 7, 10–15, 17, 19, and 22–25 are rejected under 35 U.S.C. 103(a) as being unpatentable over “Motion-based Segmentation Using a Thresholded Merging Strategy on Watershed Segments” (“de Smet”) in view of “K-Harmonic Means—A Data Clustering Algorithm” (“Zhang”). De Smet discloses using an iterative segment-merging technique to determine information for an image (abstract).

Regarding claims 1, 13, and 25, in de Smet, an initial motion field is first determined with a block-matching technique on 4 x 4 blocks. De Smet, § 2.1. These initial block motion vectors are used for the initial segmentation. *Id.* at § 2.3. Then, the step of performing the block-based motion estimation is the claimed step of “providing data points”, and the motion vectors themselves in the initial motion field are the claimed “motion paths”. Next, the segments are iteratively merged according to similar or shared motion, according to the K-means clustering algorithm. Id. This is the claimed step of “cluster[ing] the data points”. When this process is finished, the result is a series of large segments corresponding to distinct moving regions of an image, each with an associated motion vector. Id. This is the claimed step of “providing motion estimation”. However, the present invention specifies performing regression clustering according to a K-Harmonic Means function, which is not the same as the K-means function of de Smet.

Zhang discloses the K-Harmonic Means data clustering algorithm. Regarding claim 1, 3, and 25, Zhang teaches selecting K centers  $m(l)$  from N data points  $x(i)$  (pg. 1), initializing center points (pg. 2) and performing an initial iteration (pg. 5), and calculating distance  $d(i,l)$  between data point  $x(i)$  and center point  $m(l)$  (pg. 4), calculating membership probability  $p(i,x)$  based on the distance via parameters  $q(i,k)$  and  $q(i)$  (pg. 5), and stopping when the recursively-calculated performance value stabilizes, that is, when its change with each iteration becomes small (pg. 5). Then, the K calculations of centers  $m(l)$  are the claimed "regression functions" for performing regression clustering according to the K-harmonic means function. The calculation of each iteration of the recursive function is the claimed recalculation based on the membership probability, as  $m(k)$  is dependent on probability function  $p(i,k)$ . The stabilization is the claimed "stopping criterion". In the particular application of "data compression and vector quantization", these center points are the claimed "motion paths" or motion vectors of de Smet, and distance  $d(i,l)$  is the claimed "error".

De Smet discloses the claimed invention, except for using K-Harmonic Means function to perform regression clustering. Zhang teaches that it was known to perform data clustering with the K-Harmonic means function. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to perform clustering based on a K-Harmonic means function, as taught by Zhang, rather than a linear function such as the K-means function of de Smet,

since Zhang states in the abstract that K-harmonic clustering is less sensitive to detrimental effects from sub-optimal initialization than conventional clustering techniques. Additionally, the K-harmonic means function was specifically designed as an improved version of the K-means function, which "significantly improves the quality of clustering results" compared with K-means (abstract). Then, the de Smet algorithm contains a basic method which the present invention is an improvement thereof. The prior art Zhang describes a known technique, the K-Harmonic means clustering algorithm, applicable to the base segmentation method of de Smet, by substituting it for the K-means algorithm. Then, one having ordinary skill in the art would have recognized that applying the K-harmonic means algorithm of Zhang to de Smet would have yielded the predictable result of "significantly [improved] quality of clustering results" and resulted in an improved system. Therefore, it is respectfully submitted that the use of K-harmonic clustering in de Smet is considered obvious, since it has been held that applying a known technique to a known method ready for improvement to yield predictable results involves only routine skill in the art. Dann v. Johnston, 425 U.S. 219, 230, 189 U.S.P.Q. 257, 261 (1976); In re Nilsen, 851 F.2d 1401, 1403, 7 U.S.P.Q.2d 1500, 1502 (Fed. Cir. 1988).

Regarding Claims 2, 3, 14, and 15, as previously mentioned, *de Smet* produces a motion vector for each segment in an image. *De Smet*, § 2.3. As a result,



the most important moving areas are determined. *Id.* at § 3. This is the claimed production of motion vectors and at least one motion path.

Regarding Claims 5 and 17, in Zhang, a clustering in which initialization is randomized is described (pg. 11). Since Applicant admits in page 10 of the 19 January 2010 Appeal Brief that this initialization is an initialization of the algorithm as a whole, it inherently contains an initialization of the regression function.

Regarding Claims 7 and 19, insensitivity to initialization is an inherent result of the K-Harmonic Means algorithm. Zhang, abstract.<sup>1</sup>

Regarding Claims 10 and 12, in *de Smet*, pixels are set as (x, y, t) triples, with x and y as spatial coordinates and t as a time coordinate. *De Smet*, § 2.2.

Regarding Claims 11 and 23, *de Smet* illustrates motion fields. *De Smet*, figs. 3–6. Although these motion fields are not shown as overlaid on the images, the examiner takes Official Notice that it was well-known in the art at the time of the invention to display a motion field superimposed on an image to provide a visual representation of motion vectors.

Regarding Claims 12 and 24, *de Smet* illustrates highlighted motion segments overlaid on an image. *De Smet*, figs. 11, 12.

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<sup>1</sup> The rejection of Claims 7 and 19 was inadvertently omitted in the previous Office action. Since Applicant did not specifically allege claims 7 and 19 to be allowable on their own merits in the 28 July 2010 arguments or the 19 January 2010 appeal brief, nor allege that the omission of this

8. Claims 8, 9, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over *de Smet* in view of *Zhang* as applied to claims 1 and 13 above, and further in view of "A Video Segmentation Algorithm for Hierarchical Object Representations and its Implementation" (*Hermann*). Claims 8, 9, 20, and 21 disclose using color information to segment techniques, but *de Smet* only discloses "standard watershed techniques" to perform initial segmentation without providing details. *De Smet*, § 2.2.

*Hermann* discloses a method for image segmentation to extract objects from a moving image. Regarding Claim 8, 9, 20, and 21, after an initial block-matching motion estimation, similar to that in *de Smet*, images are segmented according to specific color information, followed by shape analysis, and lastly motion analysis to merge regions to determine objects. *Herrmann*, § II. This color, shape, and motion information form the claimed "predetermined criteria". In color analysis, a region is determined as homogeneous if the pixel difference in the region is below a threshold. Homogenous, connected areas are determined as "quasi-flat zones". These quasi-flat zones are further processed and become the basis for further segmentation. *Id.* at § II.B. Then, the color analysis is the claimed step of "portioning data according to color".

*De Smet*, in combination with *Zhang*, disclose a majority of the features of claims 8, 9, 20, and 21 of the claimed invention, as discussed above, except for color

segmentation. *Herrmann* teaches that it was known to segment a moving image according to color. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to determine image segmentation by color as taught by *Herrmann*, since *Herrmann* teaches in p. 205, ¶ 3, that color analysis produces the most accurate type of segmentation.

### ***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is

(571)272-9662. The examiner can normally be reached on Monday-Saturday from 10:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph G. Ustaris can be reached on (571) 272-7383. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. N. W./  
Examiner, Art Unit 2483

/Joseph G Ustaris/  
Supervisory Patent Examiner, Art Unit 2483